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Owing to the dispute in the printing trade it has been necessary to omit many editorial features from this issue of the Journal. A number of Classified Advertisements will be found in the typewritten supplement enclosed with this issue. We offer our apologies to those advertisers whose announcements have unavoidably been held over.

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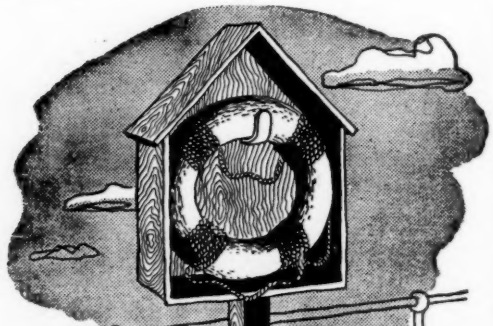

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BRITISH DENTAL JOURNAL

The Journal of the British Dental Association

VOL. LXXXIX SEPTEMBER 19, 1950 No. 6

ORIGINAL COMMUNICATIONS

SOME PHYSIOLOGICAL DATA ON THE HUMAN DENTAL PULP

BY P. PINCUS, F.D.S. R.C.S.ENG.

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SUCH branches of science as chemistry, biochemistry, pathology, bacteriology and nutrition, have, among others, been applied to dental problems, but, in general, dental tissues seem to have been less extensively investigated from the physiological aspect than other body tissues.

For example, in 1928, Fujita described respiration in 14 types of body tissues, and other tissues have since been similarly investigated. The only work on respiration so far met in the dental literature is that of Glickman *et al.*, who determined the oxygen consumption of gum tissue. It has sometimes been thought that teeth are on the border-line as far as vital processes are concerned.

The present work describes some observations on the respiration of dental pulp ; no previous reference to this has so far been met in the dental literature. A few biochemical observations on pulp tissue are also recorded.

In view of the fact that from the dental point of view, little attention has in the past been paid to the method described below, a general description is given as a background.

HISTORICAL

Galen, about the year A.D. 170, showed that arteries were full of blood and suggested that breathing added something (" vital spirits ") to the blood, and removed something (" fuliginous vapours ") from it at expiration. Leonardo da Vinci (about A.D. 1500) recognised the similarity between flame and living things, in that both consumed and altered the air. Oxygen was discovered independently by Priestly and by Scheele in 1771. The former of these discovered many facts concerning combustion and respiration (Cavendish having discovered the composition of water in 1781 and of air in 1784), determined the oxygen usage of man, propounded the true cause of animal heat and, in general, laid the foundations for the study of oxidative metabolism (Lovatt Evans).

In another field of study, since the dawn of history a number of changes had been recognised and grouped roughly together under the term fermentation, examples being the souring of milk and the turning of wine to vinegar. About 1830 it was shown that malt extract could " ferment " starch paste, i.e. convert it into sugar, when Payon and Persoz separated the active principle responsible for this action and so purified the ferment—naming it diastase. Another ferment known at this time was the pepsin of gastric juice. In 1870, Kuhne proposed to call substances capable of fermenting action, enzymes (Fearon) and since then the term ferment has been largely discarded.

In the field of inorganic chemistry, substances accelerating chemical reaction have long been known, the name catalyst having been applied to them by Berzelius in 1835 (Partington), so that the enzymes of Kuhne may be seen to be catalysts of biological origin.

Over 100 years ago, then, the study of respiration was under way when the first description of an enzyme appeared. Respiration of course at that time meant the breathing seen in man and animals.

BIOLOGICAL

Gradually the meaning attached to the term respiration changed. It no longer covered only the passage of air into and out of the lungs but became extended to cover transference of oxygen (O_2) towards the tissues and carbon dioxide (CO_2) away from them. Later respiration further extended its meaning to cover biochemical studies included in the term " tissue respiration." Eventually it has become clear that the chief significance of the biological usage of oxygen (i.e. oxidation) lies in the energy

liberated for the use of the growing and functioning cell, and so for most purposes the term " respiration " is now used to denote a chemical reaction by which energy is liberated by the cell.

This energy is used by cellular tissue in " living," i.e. in such activities as muscular action, and digestion ; the cells obtain this energy by the oxidation of substances present in them ; glucose is typical of such substances, and it will be seen below that the glucose consumption of pulp tissue has been estimated. The constant flow of such nutrient substances depends mainly on blood supply.

The manner in which oxidative processes occur in the tissues is not clearly known at present, and many factors are concerned in even the most apparently simple oxidative reactions. Substances concerned in tissue oxidation are : glutathione, cytochrome and xanthine oxidases, thyroxine, adrenaline, anterior pituitary, and the products of protein digestion. It must be constantly kept in mind that by oxidation is meant addition of oxygen or *removal of hydrogen* from a substance. Curiously enough, a great deal more is known about the way in which hydrogen is withdrawn from a substance and subsequently combined with oxygen to form water than about the way in which the carbon atoms are converted into CO_2 (Samson Wright).

The problem underlying all biological oxidations is to explain the fact that, while nutrient substances such as carbohydrate and protein are perfectly stable to molecular oxygen, when in contact with living cells they become easily oxidised (Stephenson). Oxygen is unique in that it is the only element assimilated in free, molecular form by the animal (Fearon). This oxidising action depends on enzymes, found associated with cells, though the two may be separated in some instances.

Thus it should be clear that both the breathing movements of an animal, and the CO_2 output and O_2 consumption of individual tissues are now classed as respiration. All tissues use O_2 and form CO_2 in amounts varying with their state of activity since their energy is derived from combustion processes. The heart, brain, liver, are among the most actively respiring organs ; contracting muscles also consume large amounts of oxygen.

Experimental

We have seen above that transfer of O_2 to the tissues and the removal of CO_2 from them, is now termed respiration. In experiments on this type of respiration, O_2 will be absorbed and CO_2 evolved.

In the study of tissue metabolism O_2 uptake and CO_2 output are measured in microlitres of O_2 taken up and CO_2 given off by 1 mg., weight of dry tissue each hour.

" Respiratory exchange can be studied :

(1) In the whole body, by measuring exchanges of air in the lungs.

(2) In a whole organ or mass of tissue through which blood is passed.

(3) In thin slices of tissue since circulation of blood is not indispensable if O_2 and CO_2 are provided in some other way, and some other requirements are met.

(4) In finely ground tissue pastes.

(5) In isolated enzyme systems, when there are present suitable substances on which the enzyme can act (= substrates).

" It is noteworthy that, as one approaches the isolation of enzymes, one's power of analysis increases but at the same time there is an increase in the degree in the departure from normal" (Lovatt Evans).

Dixon pointed out that " the most convenient and accurate methods available for following those reactions in which a gas is either absorbed or evolved, are those usually called manometric methods."

In 1907 J. S. Haldane and J. Barcroft described the use of a manometer for estimating gases in blood. Later, O. Warburg introduced a modified form of apparatus on the same principle. The Warburg constant volume manometer is much used in experiments in which O_2—uptake and CO_2—output are observed. A description of the use of the method is given in the book by Warburg (translated by Professor F. Dickens), and also in the work by Umbreit *et al.* The latter state " the essence of the (manometric) method is to hold the gas and fluid volume constant, and measure the decrease or increase in pressure when one gas alters in amount."

Tests have shown that the Warburg technique provides a method suitable for the present work ; for more sensitive determinations, methods such as those using a Cartesian diver might be suitable. Details of several delicate methods are described by Glick.

The Warburg method consists of observations of alterations of pressure in a manometer to one end of which is attached a small glass flask containing the tissue to be examined : the other end of the manometer is open. The flask is immersed in a bath kept very precisely at 37° C. and vigorously stirred ; the flask is shaken during the experiment. Gearing allows the shaking and stirring to be done by a small electric motor. Since solution of gas in liquid

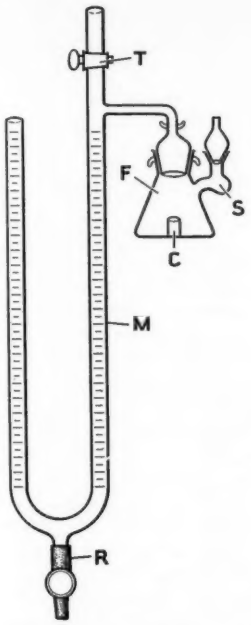

FIG. 1.—*Diagram of the Warburg constant volume manometer* : T = Three-way stopcock, to control passage of gases. F = Flask in which tissue is placed to be examined. S = Side arm with gas vent. C = Centre well, for alkali. M = Manometer. R = Reservoir containing fluid, with screw clamp to alter level of fluid in manometer. In this manner, variations in barometric pressure during the progress of an experiment are accounted for.

occurs at the surface of the liquid, the rate at which the flask is shaken affects the results ; this point has been investigated in detail by Dixon. At the lower part of the manometer (i.e. the bottom of the U-tube) there is fitted a short rubber tube-reservoir with a screw clamp ; this is manipulated to cover variations in barometric pressure during the experiment.

In experiments of the type described here, it is considered that O_2-uptake and CO_2-output constitute the only gases involved. A full discussion of the points involved is outside the scope of the present paper, but two aspects may be mentioned. Measurement of the gases concerned forms the basis of the method and it is assumed that the O_2 and CO_2 are free to be measured. In actual fact, adsorption of gases on to solids occurs ; these are classed with other factors as " retention " factors, and are omitted from calculation in the present work. The second aspect is that of damage to tissue cells.

Slices less than 1 mm. thick are used to establish the best conditions for gaseous exchange. In our experiments, pulps were used almost entire since the thickness of most specimens seldom exceeded 1 mm. At the start of experiments in which slices are used, the damaged cells respire at a rate greater than that of intact cells, but in our experiments intact cells greatly outnumbered the damaged cells, and such an effect can therefore be disregarded.

In the present work, freshly extracted teeth were broken open with light hammer blows, and the pulp tissue removed with tweezers. Histological examination (fig. 2) shows that the pulp is torn away without odontoblasts, which presumably are kept in place by their processes extending into the dentine. The section illustrated is that of the pulp of a central incisor tooth, cut parallel with the gum margin. It is seen that odontoblasts are absent from the edge of the pulp, but that the outer layer of the pulp is relatively cell-free ; this is probably the zone of Weil (Orban). In places, the pulp tissue appears to be bounded by a membrane, illustrated in fig. 3. In the intact tooth this would lie next to the odontoblasts. It is not clear whether a membrane actually exists in this

FIG. 2.—Cross section of human dental pulp which was obtained by breaking open an upper central incisor tooth. Odontoblasts are absent from the margin. Microtome preparation, stained with hæmatoxylin and eosin. × 89.

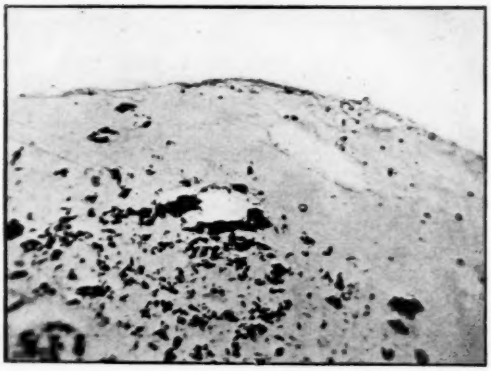

FIG. 3.—Higher magnification of part of fig. 2, showing the layer of the pulp immediately under the odontoblasts, and the relatively cell-free zone of Weil. In places an actual membrane appears to contain the tissue. × 210.

situation, or whether the appearance shown is an artifact caused by the retraction of the edge of the tissue, aided by the action of the formol used as a fixative.

Histological examination has also shown that when teeth are broken as in this work, tiny fragments of dentine are often entangled in the pulp tissue. It was found impossible to be certain that no dentine fragments were included, and accordingly weights of pulp tissue are to the nearest milligramme only.

The aim of the work was to estimate respiration of healthy pulp tissue, and accordingly only healthy pulps of firm consistency, and light pink in colour, were used. Through the kind co-operation of the Eastman Dental Clinic, Mr. C. F. Ballard arranged for the collection of some pulps from sound teeth removed for orthodontic purposes. Pulps were under investigation within thirty minutes of removal from the mouth in many cases ; in a few instances pulps were not examined until two hours had elapsed.

In the observations described below, teeth were broken open and pulps were removed as nearly intact as possible. No investigation of enzymes involved has been attempted.

Reference to the above list of five methods of investigation given by Lovatt Evans, will show that the present method of collection of clinical material fell about midway in the list. When the work was commenced, it was not realised that only part of the pulp was in fact being removed, leaving the layer of odontoblasts in situ ; so far, this difficulty has only been partly overcome. Experiments were, then, carried out on masses of pulp tissue devoid of circulating blood, but provided with oxygen and surrounded by a fluid medium known to be adequate for many tissues. The only nutrient substances were those actually present in the pulp on collection.

The original aim of the work—to investigate respiration in completely intact pulps—has not been attained.

METHODS

Pulps were immersed in Krebs-Ringer solution, which contains NaCl, KCl, $CaCl_2$, KH_2PO_4, $MgSO_4$, Na_2HPO_4. (By accident some pulps were kept in physiological saline (0·9 per cent NaCl solution) for several hours ; in this latter case no significant respiration could be observed, a result which might be attributed to the action of the saline and to the undue delay before testing.)

In all, 19 estimations have been carried out. After test and determination of wet weight, pulps were dried for two hours at 100° C. then weighed. Some pulps were dried at 116° C. over n-butyl alcohol, and others at 118° C. over ethylene diamine, both boiling. No advantage appeared to be gained by either of these methods, and they were abandoned. The unavoidable inclusion of dentine particles, referred to above, interfered with accurate estimations of weight, and probably accounts for variations in percentage loss of weight on drying. The smallest collection of pulp tissue weighed 20 mg., and the largest 274 mg., both wet weight. The lowest loss of weight on drying was 64 per cent, and the highest 90 per cent, with an average loss of 76 per cent throughout the series of experiments.

Umbilical cord resembles pulp tissue histologically to some extent, and two specimens of cord were examined within a few minutes of removal. The first specimen weighed 102 mg. wet, and lost 89·2 per cent on being dried, while the second weighed 104 mg. wet, and lost 90·4 per cent on being dried.

PRESENTATION OF RESULTS

In the table of results below, Q_{O_2} is the term used to express oxygen consumption, generally shown as in the present work in microlitres per mg. weight of dry tissue per hour. Similarly, Q_{CO_2} is the term used to denote carbon dioxide output in microlitres per mg. weight of dry tissue per hour. The respiratory quotient (RQ) is found on dividing Q_{CO_2} by Q_{O_2}.

TABLE I

Respiration of human dental pulp

Q_{O_2} for seven experiments was 0·31 microlitre per mg. weight dry tissue per hour.

Q_{CO_2} value was 0·29 microlitre per mg. weight dry tissue per hour.

Respiratory quotient is therefore $\frac{0{\cdot}29}{0{\cdot}31} = 0{\cdot}93$.

Respiration of umbilical cord

Q_{O_2} for umbilical cord was 0·18 microlitre per mg. weight of dry tissue per hour.

In considering the results shown above, it must be remembered that pulp tissue consists partly of connective tissue, in which respiration is minimal, since Warburg (loc. cit.) recorded respiration of rat muscle fascia as " very small."

In experiments on tissues such as liver, brain, muscle, a slice may be used to estimate O_2 consumption and an adjoining slice to estimate CO_2 consumption. With dental pulps, this was impracticable and some practically whole pulps were used for one set of tests while a different collection was used for other tests. Since experiments were not performed on the same samples for measurement of O_2 consumption and CO_2 output, in that respect the figures given are approximate only.

In actual fact, CO_2 output is measured by alkali absorption followed by calculation, of which technical details are outside the scope of the present paper. As is usually the case, the RQ figures are merely the average of carbohydrate, protein and fat metabolism and so come in a range between the figures for fat (0·718), protein (0·81) and that for carbohydrate (1·0) Lovatt Evans. Since carbohydrate is the substrate mainly utilised by the pulp as with all other tissues, the RQ value of 0·93 found in the present work naturally approaches that recognised for carbohydrate, 1·0. The ability of tooth-pulp to utilise carbohydrate aerobically was determined in experiments in which glucose-Ringer solution was used as a suspending medium.

The occurrence of aerobic glycolysis was definitely established but, due to the limited number of experiments, quantitative determinations are omitted.

Some consideration was given to the question of bacterial contamination arising either in pathological pulps or as a result of manipulation without precautions as to sterility. Growing bacteria normally increase in numbers, thus giving an increasing rate of respiration. In the present work no such increase was noted, the readings remaining constant for a given time. Accordingly it is thought that the respiration recorded was due to the pulp tissue and not to the accidental inclusion of bacteria.

Concerning bacteria in pulps as collected, Gunter *et al.* cultured 17 tooth-pulps, taking strict precautions against accidental bacterial contamination. They found no bacteria present. In the present work the aim was to examine healthy pulps only, and either desiccated or congested pulps were avoided. However, teeth are as a rule removed either because of caries or pyorrhœa. No bacteriological examination was undertaken, but there is no doubt that bacteria were present in the tissues examined. It may be that pulp tissue could support bacterial growth, but an attempt to grow a pure culture of a mouth organism on sterile pulp tissue was unsuccessful (Pincus).

Hill has discussed the pathology of the dental pulp in some detail. His sections do not show bacteria in pulps, and it might then be said that the demonstration of the presence of bacteria in pulps is so far incomplete.

The work had reached the present stage when the observations made by Rovelstadt and St. John appeared. They describe histological appearances seen in young dental pulps after application of NaF to freshly cut dentine. Among changes noted were formation of vacuoles in both pulp-cells and odontoblasts, and some loss of regularity of the odontoblastic layer. It should be of interest to ascertain whether such pulps behave normally in other respects.

BIOCHEMICAL DATA

The only biochemical data on pulps found so far in the literature are those given by Hodge, who recorded 0·91 per cent moist weight as lipids, 0·70 per cent as phospholipids, and 0·11 per cent as cholesterol.

In collecting pulps for our biochemical work, the teeth were not broken open. The crowns were separated by cutting, after which the specimen was well washed in water then the pulp tissue removed. Examinations showed that no dentine fragments were included in this series of experiments. During collection, pulps were kept for some days in water saturated with chloroform. However, the biochemical results are of pulp tissue free from dentine.

In the present work, the following qualitative tests of pulp tissue have been found positive : Millon, xanthoproteic, Sakaguchi, ninhydrin, hexosamine. Nitrogen (Kjeldahl) was 10·1 per cent, on a moisture and ash free basis; on the same basis sulphur was 0·4 per cent. The low

nitrogen and the presence of hexosamine suggest the presence of a mucoprotein. Pulp tissue was ashed at 500° C. for one hour and then calcium and phosphorus determined. On a basis of 100 mg. dry weight pulp tissue, there were present 5·7 mg. calcium and 3·5 mg. phosphorus. Leicester has discussed the difficulties associated with the quantitative reduction of dentine to ash ; such difficulties are commonly found when ashing substances containing phosphorus. Some of these difficulties are met with in the ashing of pulp tissue. It has been pointed out above that Hodge found phospholipids present in pulp tissue. The ashing of three samples of pulp tissue showed that 21·2 per cent ash was present in dry pulp tissue, which figure may be contrasted with percentages of ash given in Tabulae Biologicae, where 13 animal tissues show ash averaging 14 per cent.

Summary

The O_2 consumption and CO_2 production of healthy tooth-pulps was measured by the Warburg method and the following figures found :

$QO_2 = 0{\cdot}31 \quad QCO_2 = 0{\cdot}29 \quad RQ = 0{\cdot}93$

Limited biochemical examination of pulp tissue shows that protein is present, containing low nitrogen, and some hexosamine ; these characteristics are generally associated with the class of proteins known as muco-proteins.

Acknowledgments

To my colleagues at the Hospital, and for the financial support of the Medical Research Council, grateful thanks are recorded. Dr. F. Hobbiger kindly carried out the Warburg determinations.

Addendum

Dehydrogenases using pyruvate, and possibly also lactate and succinate as substrates, are now found together with oxidase, in dentine, thus forming an oxidation-reduction system. This possibility was kindly suggested by Dr. Malcolm Dixon, F.R.S.

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THE POLYMERISATION OF ACRYLIC DENTURE BASE MATERIALS

By E. MATTHEWS, D.D.S., Ph.D., D.I.C., F.D.S. R.C.S., and W. R. TYLDESLEY, M.Sc.
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During the time that the powder-liquid type of acrylic denture base material has been in general use, various techniques have been suggested for the curing process. There is a very considerable divergence of practice within the possible ranges of time and temperature variation.

The present investigation was carried out with a view to differentiating between the varying methods of curing, including those suggested by manufacturers and those others used in widespread practice, and to attempt an estimate of their relative suitability. The criteria of suitability herein studied were those of tensile strength and degree of polymerisation.

The Polymerisation

The dough, as packed in the flask, consists of particles of polymethyl methacrylate suspended in a syrupy solution of the polymer in methyl methacrylate liquid. During the curing the monomer molecules combine to form the long chain molecules of solid polymer and so bind the mass together.

The results of incomplete polymerisation might be shown in the physiological reactivity of the finished material and in its physical

properties. It is a well-known fact that methyl methacrylate has a strong irritant effect. Any retained monomer in the denture base might, therefore, be a source of irritation to the oral mucosa, so that its presence in a denture base in the unpolymerised state is quite inadmissible.

From the point of view of physical properties of the finished material it is generally accepted that for all high polymers, the length of the polymer chain has a profound influence. It is stated by Mark (1942) that increase in degree of polymerisation leads to an increase in tensile strength, impact strength, surface hardness and moisture resistance amongst other properties.

Methods of Investigation

The technique adopted in this work consisted of the production of tensile specimens of the resin under investigation by normal workshop procedure. These specimens were produced in exact compliance with the instructions issued by the manufacturers and in conformity with other widely used methods. The form of the specimens was that normal in tensile testing, the thickness being comparable with the thickness of a normal denture base (1/10 in.).

Each specimen was produced from a wax pattern invested in the normal manner in stone. The powder-liquid ratio was standardised at 3½ to 1 and the same bulk of material was mixed for each specimen. All other conditions not specified in the techniques investigated were held as constant as possible.

After deflasking, the specimens were trimmed and polished and the width and thickness were measured at three positions along the gauge length.

The specimens were then tested to destruction in the Tensometer Tensile Tester and the tensile strength calculated on the original cross sectional area at the site of fracture.

After fracture the broken specimens were weighed and molecular weight determination was then carried out using the technique suggested by Caul and Schoonover (1949). In this way the mean molecular weight of the material was obtained—this being a very sensitive measure of the presence of molecules of low polymerisation.

In all cases tests were carried out on at least six specimens, cured in the same manner.

The materials used were two of those most widely used by the profession. In each case the pink material was employed, preliminary tests showing that the presence of the colouring matter has no effect on the molecular weight determination.

Table I.—Material S

	Cure	Mean molecular weight	Tensile strength (lbs./sq. in.)
S1.	Uncured powder	4,500	—
S2.	6 hours at 65° C... ..	4,900	4,600
S3.	Recommended " Reverse " cure with final boil of five mins. instead of ten mins.	5,000	5,700
S4.	Recommended " Reverse " cure*	6,900	6,300
S5.	Recommended " Reverse " cure with final boil fifteen mins. instead of ten mins.	14,300	7,300
S6.	Recommended " Slow " cure†	16,200	7,500
S7.	Recommended " Normal " cure‡	20,000	7,800
S8.	Brought to boil in half hour then boiled for one hour	23,500	8,150
S9.	Placed in boiling water, allowed to cool to 65° C., held one hour, raised to boil in half hour and boiled one hour	25,000	8,300
S10.	Vulcanised eight minutes at 45 lb. pressure§ ..	26,500	8,450
S11.	Boiled six hours	27,000	8,500

*Place in boiling water, allow to cool for one hour, hold at steady temperature (65° C.) for thirty minutes, bring to boil in ten minutes and boil for ten minutes.

†Heat from room temp. to 65° C. in thirty minutes. Hold at 65° C. for one hour, raise to boiling in twenty minutes, and boil for fifteen minutes.

‡Place flask in cold water, bring to boil in not less than thirty minutes ; then boil for thirty minutes.

§Place flask in cold vulcaniser, bring to boil in thirty minutes, then close steam valve and bring to 45 lb. pressure in ten minutes. Hold for eight mins. Release valve. Remove flask and bench cool for thirty minutes.

Table II.—Material K

	Cure	Mean molecular weight	Tensile strength (lbs./sq. in.)
K1.	Uncured powder.. ..	10,000	—
K2.	Six hours at 65° C. ..	11,000	5,800
K3.	Brought to boil in half hour, boiled for five minutes	14,000	6,500
K4.	Brought to boil in half hour, boiled for fifteen minutes	18,000	7,200
K5.	Brought to boil in half hour, boiled for half hour	29,000	8,150
K6.	Brought to boil in half hour, boiled for one hour (Recommended cure) ..	41,500	8,900
K7.	Vulcanised eight minutes at 45 lb. pressure* ..	47,000	9,100
K8.	Boiled six hours	49,700	9,200

*As for material S.

Discussion

The fact which becomes at once clear from the figures shown is that the degree of polymerisation seems to depend far more on the time for which the flask is in boiling water than on the time at lower temperatures. With regard to the low temperature cure S2, it must be said that both the degree of polymerisation and the tensile strength are highly unsatisfactory, the degree of polymerisation being very little greater than that of the uncured powder. Each of the remaining cures S3 and S11 include a period at boiling point (100° C.) and the steady increase in polymerisation and in tensile strength as the time of boiling is increased to one hour as in S9, is quite striking. After this little seems to be gained by increasing the time of boil. Thus, in cure S11, a six-hour boil leads to an increase of less than 10 per cent in both polymerisation and tensile strength over the one hour boil of S9.

It has often been suggested that a complex and long curing cycle is necessary to give a denture both fully cured and free from porosity, but the authors would, however, suggest that the degree of porosity is directly dependent on the rate of heating of the flask, and that for a properly packed normal case a virtual elimination of porosity is attained by raising to the boiling point in thirty minutes. The contribution that faulty packing may bring to the porosity of the denture has, in the opinion of the authors, been understressed.

With regard to the vulcaniser cure, it is quite clear that the allegations of incomplete polymerisation during the eight-minute vulcaniser cure are unfounded.

With regard to porosity, effective control can be exercised by proper packing and the avoidance of too rapid heating. Experiments with clear material show that porosity is virtually non-existent in a denture when the flask is placed in the cold vulcaniser and the method described under S10 is followed. The method is completely satisfactory where porcelain teeth are used and several thousand cases have been so processed in this department.

With acrylic teeth, however, some lightening of shade (bleaching) commonly occurs. Experiments were carried out with half-sets of anteriors cured in various ways. It was found that dough-moulded teeth were less prone to "bleaching" than were the powder moulded ones.

There was a lightening of colour whether the vulcaniser (S10) or the boiling for one hour (S8) cure was used but with dough-moulded teeth the change of colour could, for practical purposes, be ignored.

It should be appreciated that the preponderance of acrylic teeth on the dental market are of the powder moulded variety but the dough-moulded ones are also available.

Although the discussion has been restricted to the results obtained from material S it will be seen on referring to Table II that exactly the same deductions may be drawn in the case of material K.

Summary

Data has been adduced for many of the curing techniques employed for acrylic denture base materials.

The practical implications are that superior results in terms of physical properties and chemical inertness can be obtained either by the vulcaniser cure (cf. S10, K7) or by the boiling method (cf. S8, K6).

Where absolutely minimal changes of colour values of the acrylic teeth are desired the latter method using dough-moulded teeth, is slightly superior.

References

CAUL, H. J., and SCHOONOVER, I. C. (1949) *J. Amer. dent. Assoc.*, **39**, i, 1.
MARK, H. (1942) *Ind. Eng. Chem. Ind. Ed.*, **34**, 1343.

EVERYDAY PROCEDURES IN DENTISTRY

PREPARATION OF THE MOUTH FOR DENTURES

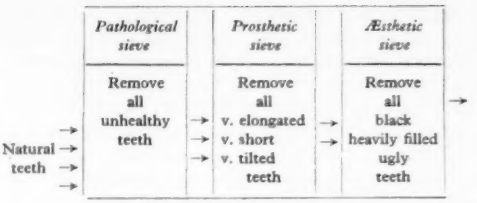
By ARTHUR G. ALLEN, F.D.S. R.C.S.Eng.

Director of the Department of Prosthetic Dentistry, London Hospital Dental School

We are reminded *ad nauseam* and almost daily that this is the age of planning, yet a moment's thought will serve to show that this age can no more claim a monopoly in this respect than any other age. Likewise, in the preparation of the mouth for dentures there has always been some kind of a plan, but today our increasing knowledge of oral disease and our growing awareness of the

consequences, and indeed the real dangers, of bad prosthetics, have made careful planning a first necessity. In fact, no branch of our craft calls for more careful planning since its successful execution embraces not only prosthetics, but nearly all other branches—possibly oral surgery, plastic surgery, parodontics, and conservative procedures, to name but a few. Our first requirement then is a plan. By examination of the mouth we devise it, and by preparation we commence to put it into operation. It is to the examination of the mouth that we first direct our attention and since, presumably, the aim is long-term dentures, it must be careful, critical, and comprehensive. Careful, because decisions taken cannot be easily reversed without endangering that priceless prerequisite, the confidence of the patient in our ability to meet his needs. Critical, because the health of the patient may depend upon a true assessment of his oral condition. Comprehensive, because—at least in partial denture prosthesis—we must learn to approach our problems in terms of the unity of the arch as a composite whole. That is to say, we must avoid the error of regarding the denture foundation (or seating), and the retained teeth, as separate entities. Prosthetically they form one unit of which the parts are interdependent. For example, a denture foundation, ill-fitted to bear the strains imposed upon it by a badly designed denture, may undergo such changes through resorption that the teeth adjacent to the denture may suffer irretrievable damage. The reverse is equally true though the mode of operation is different. Again, many sound teeth have been lost through the prolonged use of temporary dentures which have ceased to fit.

Just as a plan is preceded by examination, so examination is preceded by full mouth radiographs, upon the necessity for which too much emphasis cannot be laid. They are as essential to the dental surgeon as is a geological survey to the structural engineer. Information is required, not only about the condition of the standing teeth, but about the spaces in between, in which buried roots, or unerupted teeth, or residual areas of infection, may lie clinically undetected, and also about the condition and amount of resorption in those spaces. In short, all the available clinical and radiographical evidence relating to the arch as a whole must be to hand. Insufficient evidence in this respect may lead to a short-term denture, and that may lead to a full denture by the short road. Logically, the examination of the teeth is undertaken first, and must be threefold in character. Metaphorically speaking, they must pass through three sieves if they are to qualify for a permanent place in the arch. The first and most important sieve is a pathological sieve, the second is a prosthetic sieve, and the third is an æsthetic sieve, thus:


Pathological sieve
Prosthetic sieve
Æsthetic sieve
Natural teeth
Remove all unhealthy teeth
Remove all v. elongated v. short v. tilted teeth
Remove all black heavily filled ugly teeth

The Pathological Sieve

Experience, however, tends to show that too often only the pathological demerits of the teeth are considered to the almost complete exclusion of their shortcomings in other respects. With the first sieve, the question is, which teeth should be condemned upon purely pathological grounds? That is to say, how wide should the meshes of our hypothetical sieve be, having regard to the general condition of the patient? At all times the fate of particular teeth should be so related—that is a *sine qua non*. To advocate that no tooth must be retained unless it is healthy as it stands is, unfortunately, a council of perfection leading inevitably to a vast increase in the output of full dentures, since considerably more than half the teeth extracted today are lost through parodontal disease, and the latter, if present to a degree which calls for extraction of some teeth, is likely, owing to its chronic and general nature, to be present in some measure in all. The meshes of our pathological sieve, thus unavoidably must be just wide enough to pass not only those teeth which are healthy but also those which are healthy *enough*, and in the latter we hope that treatment will effect an improvement if not a cure. The problem of exactly what to retain and what to extract on pathological grounds need not detain us further here—sufficient is it for us to keep our eyes wide open to the shortcomings of many teeth which perforce are retained, not because they are healthy but because they are healthy *enough*.

The Prosthetic Sieve

The survivors of this crucial test must now pass through a prosthetic sieve, for it is not in the interests of a long-term denture to retain teeth which will create prosthetic difficulties so great as to endanger its efficiency. For example, badly tilted teeth, even if healthy, may lead to a locally badly fitting denture —it may be unavoidable ; a very elongated tooth may lead to undue strains falling upon a denture in the opposite jaw, or a tooth may be functionless and so much out of alignment that it creates a space difficult to fill either hygienically or æsthetically. Such teeth are better extracted. But at the same time remember always the prosthetic values of teeth as well as their demerits, and judge accordingly. For standing teeth have their value although this varies according to their position in the arch, and according

to the presence or absence of other teeth. Prosthetically the canines and the molars have the highest value for they most effectively brace the arch against the strains imposed upon it. A balanced arrangement in the arch, for instance both canines present as well as a molar on each side, is ideal. However, a canine in one quadrant and a molar in the distal quadrant on the opposite side may make all the difference between a long-term and a short-term denture. For example, no denture which is to be long-term can be built round four incisors and one canine in an otherwise edentulous mandible, for such an arrangement is prosthetically unstable. The teeth will give under the strain, commencing with the outermost incisor somewhat like a row of wooden palings when a bracing post has gone. On the other hand, the prognosis is vastly more hopeful if there is a molar on the opposite side to the canine. The support on that side is materially improved, and any swinging tendency on the part of the denture is effectively countered. In short, long-term dentures ideally are those which can be built round canines and molars, for these teeth are the posts and all others are merely the palings. Judge then the intrinsic merits of each tooth, but take care also to relate them to their companions in the arch.

The Æsthetic Sieve

Finally comes the æsthetic sieve bringing with it unique problems for solution. The wise patient has hitherto bowed to our superior judgment but now he takes an active part in the decisions, and rightly so for æsthetic standards are not, and indeed cannot be, rigid. In this respect, patients fall into one of two main groups—those whose confidence in our æsthetic judgment and prosthetic ability is such that they demand a " clean sweep " when such a drastic course may not be indicated, and those who are so blind to the æsthetic shortcomings of their teeth that they will countenance no change, however small. Beware of the first for dissatisfaction will inevitably follow a hasty concurrence in such a step, and tolerate the second if persuasion fails. Broadly speaking, all very dark or black teeth, heavily filled teeth, and on occasion even hypoplastic teeth, are better extracted unless they have a high prosthetic value.

The systematic survey having been completed, it yet remains to review the position finally. Are the teeth which, on all counts, can be regarded favourably, sufficient in number and conveniently disposed in the arch to qualify for a permanent place? They may be situated in but one-half of the arch and so be unable to withstand the very heavy lateral strains which unavoidably will be imposed upon them ; they may be too few in number and functionless as well. In all such circumstances the question of a clearance must be considered, bearing in mind that if teeth change at all they change for the worse, particularly when a partial denture is worn. So much for the teeth.

Similar considerations of pathology, prosthetics, and æsthetics will dictate the course of action regarding the denture foundation. Pathological conditions in the ridge call for no comment here, but decisions must be based upon correct radiographic interpretation, wide knowledge, and sound clinical judgment. Prosthetic considerations may call for alveolectomy, or æsthetically an immediate permanent as opposed to an immediate temporary denture may be indicated.

Preparation of Foundation

So much for examination and the emergence of a plan. Now for the preparation. Broadly considered, cases can be classified as follows :

(1) Those requiring the removal of some or all of the teeth.

(2) Those which in addition to the above also require some surgical preparation of the denture foundation.

(3) Edentulous cases requiring some preparation of the denture foundation.

Cases Requiring Removal of Some or All of the Teeth.—Broadly speaking, when extractions are indicated, the first question prosthetically should be : is an immediate denture indicated or not? The answer, subject always to the general condition of the patient, should be in the affirmative when anterior teeth are involved for reasons which need not be discussed here. If a clearance is the plan, it is necessary to decide whether the operation is to be in one stage or in two stages. By this is meant the construction of the denture or dentures followed by total extractions, or the removal of the posteriors in stage one with an interval (usually three weeks) before commencing the dentures, followed by the extraction of the anteriors upon completion in stage two. The first is not the method of choice in many cases for it is undesirable to perpetuate an articulation which may be unbalanced or even traumatic. The second method affords an opportunity, not to be missed, of obtaining some measure of balance, and enables the operator to consider the anteriors as a separate and purely æsthetic problem. Moreover, it enables the bite to be raised just sufficiently to compensate for some if not all of the settlement—a very important point. Whichever course is adopted, the gums should be treated if necessary, the extractions carefully carried out, and the sockets closed with digital pressure. Incidentally select the shade upon every available occasion right up to the last possible visit, for atmospheric conditions change from day to day and so do our subjective reactions. Socket the artificial anteriors carefully on the model

to a depth commensurate with the estimated depth of the pockets present unless there is a preference for inserting the acrylic teeth direct into the final impression before pouring.

The removal of root fragments and the elimination of residual areas of infection will have been carried out before the impression stage is reached and the difficulty of finding them duly surmounted. In general, the difficulty increases as the edentulous state is approached and radiographically a wax localising plate carrying short lengths of bent wire is often indispensable. Having been located in the radiographs, their position is pinpointed on the model which should be to hand during the operation. Since it cannot be handled at that stage a most careful study of its surface contour must be made beforehand to assist identification in the mouth. Local anæsthesia is the method of choice in these cases but it depends first and foremost upon the condition of the mouth.

Cases which Require, in Addition to Extractions, Some Surgical Preparation.—Alveolectomy ranges in degree from the smoothing of localised sharp margins of alveolar process—particularly the interdental septa—to the removal of alveolar bone over the entire extent of both arches. The latter is usually accompanied by the insertion of immediate permanent dentures to maintain the vertical dimension, unless there are definite contra-indications. The operation calls for considerable surgical skill and some nicety of judgment if it is to be successful—surgical skill, to ensure the best possible surgical result (and the ability of the ridge to bear denture pressure afterwards depends upon it), and nicety of judgment, because the extent of the surface area of the ridge and the duration of the immediate permanent denture depend upon it. In short, if too little is removed the denture will rapidly lose fit through resorption, if in fact it can be inserted at all, and if too much, neither the said denture nor any other will ever be entirely satisfactory. Conservation should be the watchword ; this cannot be overstressed, for many a ridge has been ruined by the over-zealous operator. Alveolectomy is usually indicated in cases of this kind solely for pathological reasons as prosthetic and æsthetic indications if present are often masked by the presence of the teeth. The operation must be performed under penicillin cover with a general anæsthetic and must be preceded by gum treatment as an additional preoperative measure. It is often preferable to reflect the gum-flaps and remove the alveolar process in the main, before removing the teeth since the latter serve as a guide and assist manual control during instrumentation. When the gum-flaps are replaced and trimmed to exact linear contact without tension, the suture line should be, if possible, positioned slightly labial or buccal to the crest of the ridge to avoid direct pressure from the denture. Assuming that the position of the natural anteriors is to be retained, the acrylic teeth are positioned as for an immediate temporary denture except that they are not let into the plaster model so deeply. The plaster cast is then trimmed to the desired extent and contour and an impression taken of it for the construction of a clear acrylic template. At operation the ridge is trimmed until both the template and the denture exactly fit.

Edentulous Cases Requiring Some Preparation of Denture Base.—It is only after the lapse of some months after extractions that the shortcomings of the edentulous arch stand fully revealed. There may be over-large and undercut tuberosities or a very prominent torus palatinus, either of which conditions may possibly call for surgical intervention. There may be an almost complete absence of mandibular sulcus, or the ridge may be narrow, blade like, and spinous, giving rise to symptoms, and in both conditions there may be a definite need for surgery. An artificial sulcus lined with a skin graft aids the ridgeless patient somewhat. The flatter the ridge the more we turn to surgery, yet it should be noted that the flatter the ridge the more horizontal the pocket becomes, whereas depth is always the desired objective. The Thiersch graft is laid carefully in its prepared bed with all folds smoothed out and is held in place either with a composition core or with a suitably shaped acrylic base plate, the former by sutures, the latter by circumferential wires. Skin grafts tend to shrink rapidly unless prevented from doing so and it is necessary, therefore, to replace the core or base plate (after the graft has taken) by a denture or a Gunning splint. Ridge reduction by open operation is indicated where the denture foundation is thin and spinous and unable to support the weight of the bite. The sharpness of the ridge crest is all too apparent when the gum flaps have been reflected, and the objective is to obtain a broader base for the denture. The operation is simple but is preferably carried out under a general anæsthetic.

SHORT COMMUNICATION

GROSS DECALCIFICATION AND CARIES OF LOWER DECIDUOUS TEETH

By G. E. M. HALLETT, F.D.S. R.C.S.Eng.

From the Department of Children's Dentistry, Newcastle upon Tyne Dental Hospital

This case is reported as one of interest in view of the gross decalcification and caries of the lower deciduous teeth—especially the incisors which were far worse than the upper incisors—the reverse of the usual clinical picture. The history was briefly as follows :

Aged 7½ years, male, only child—not breast fed. Parents elderly. Mother lost all teeth by the age of 21. Father has full dentures. Diet highly farinaceous and sweet. Eats little meat and fruit and no raw vegetables.

The upper teeth.

The lower teeth.

Radiographically, dental development is delayed. The child has had a persistent habit from babyhood of holding a bolus of food (mostly a pasty mass of bread and saliva, or sweetened biscuit and saliva) in the lower anterior vestibule of the mouth for prolonged periods, thus causing the lower lip to bulge forwards. He slowly sucks this pasty mass, which would be undergoing diastatic fermentation, so that the lower teeth would be immersed for long periods in a medium favourable for lactic acid production and bacterial multiplication. The upper teeth might be protected to some extent by the lower lip coming behind them during the sucking action. At all events the lower incisors were decayed away to gum level and it must be presumed :

(1) That the quality of the teeth was generally poor due partly to genetic influence and partly to poor nurture.

(2) That there was local exciting factor resulting in heightened carious activity affecting mainly the lower incisors.

It was necessary to extract all the deciduous teeth except ba | ab forthwith.

Photographs by J. B. Jackson, A.R.P.S.

Reviews and Abstracts

THE GERMAN YEAR BOOK OF DENTISTRY FOR 1950. Published by Carl Hauser Verlag, Munich. Pp. 366. Price 6 DM.

This book is a symposium of a number of papers designed as a condensed post-graduate course.

Professor H. H. Rebel opens with a chapter on " Apicectomies," in which he discusses their pathology, indications and contra-indications, and describes very fully the actual operation and post-operative treatment. The reader is warned against a number of pitfalls and advised how to avoid them. The paper is, however, marred by some illustrations being upside down, and some of the legends being printed under the wrong pictures.

Professor H. Wolf, writing on " Prophylaxis, Diagnosis and Therapy of Gingivitis and Stomatitis," seems a little categorical, and therefore complacent, with regard to his treatment. Vincent's gingivitis, for instance, is treated with massive doses of a sulpha preparation and local applications of hydrogen peroxide alternating from day to day with neosalvarsan. The avitaminoses are only mentioned.

Professor F. Brosch, discussing " Pitfalls in Oral Surgery and How to Avoid Them," deals with the more common errors of judgment in oral diagnosis without, however, discussing sufficiently the more important question of how to avoid them.

Dr. E. Flohr recommends in " The Treatment of the Necrotic Pulp" restricting any attempts at root-treatment to those cases where there is a clearly circumscribed peri-apical area of rarefaction and where the root can be made fully accessible. His experiences as a prisoner of war in the United States seem to have opened his eyes to the possible consequences of over-enthusiasm in root-treatment. He compares the corresponding figures for root-treatment in the Bavarian Health Service and the U.S. Public Dental Clinics, which show that in Bavaria 225 times as many root-treatments were carried out, if related to fillings, and 525 times as many, if related to extractions, as in the U.S.

In the paper on " The Problem of the Fixation of Partial Dentures," by Professor W. Balters, the psychologic effect of the appliance on the wearer is discussed at considerable length but the technical aspect is unduly over-simplified.

Dr. V. K. Ilg describes in detail the standard procedure of jacket crown preparation ; numerous illustrations making every step clear. A chapter on " Common Errors and Pitfalls " concludes a concise and well-written paper.

Writing about the so-called "Norwegian System" Professor C. Scheidt stresses the point that the system is designed to provide nature with a pathway to guide growth into a different channel. This leads the author to compare active movement *versus* stimulation by activators. The methods suggested are too complicated and demand much too advanced an orthodontic knowledge and skill to make them a safe procedure in the hands of the general practitioner.

Professor H. Gerlach, writing on " The Movement of the Canine into the Space of Extracted First Premolar," advises the exclusion of all those cases where the slant of

the canine root is unfavourable. Fixed appliances with elastics worn at night-time are used for the canine movement.

Dr. J. Kluczka's methods of spot-grinding and bite-raising, "The Treatment of Malocclusion in Parodontal Therapy," appear somewhat radical. The chapter on partial dentures is adequate, but the chapter on the use of orthodontic treatment for the correction of malocclusions discusses the question whether orthodontic treatment is at all indicated in cases of parodontal involvement.

Professor H. Loebel discusses "The Relation between the Maxillary Antrum, Nose and Teeth" from the viewpoint of the Ear, Nose and Throat Surgeon and deals with the more important pathologic conditions met with.

The book concludes with a brief chapter on "Sterilization of dental instruments" by Professor Greve; an abbreviated pharmacopœia; a chapter on "First Aid"; and others of purely local interest.

Treatment of Penicillin-Streptomycin Resistant Organisms in Root Canals of Infected Pulpless Teeth.—One of the organisms found in root canals which is resistant to penicillin-streptomycin mixtures is the *Candida* (*Monilia*) *albicans*. This organism is destroyed by Octimet, a quaternary ammonium-type wetting compound. It was thought that this compound in propylene glycol solution might with advantage be added to penicillin-streptomycin mixtures for use in root canal therapy, with the added advantage as a wetting agent of aiding the dispersion of the antibiotics. 26 cases were treated and it was found that not only did the mixture fail to destroy both antibiotic-resistant and sensitive organisms but, although the Octimet was not irritant to skin and mucosa, several patients developed symptoms of periapical irritation. It was concluded that the addition of quaternary ammonium-type compounds was a failure, by destroying the potency of the antibiotics and being irritant to tissues.—SELTZER, S., BENDER, I. B., CHRISTIAN, C. (1950) *Oral Surg.*, **3**, 802.

Messrs. Henry Kimpton, 25 Bloomsbury Way, W.C.1, have asked us to point out that they are the publishers in this country of Dewey: Practical Orthodontics (Seventh Edition), reviewed in the September 5 issue of the *British Dental Journal*. The price is 70s. net.

Obituary

ARTHUR ALEXANDER ROBERT CROWE, L.D.S.Eng.

MR. A. R. CROWE, L.D.S.Eng., who died at Bedford suddenly, was a student at Guy's Hospital. At the outbreak of the 1914 war, he joined up with the Artists Rifles and served with the Forces in France through the war. The service prefix, which is by tradition associated with his name, became his, and throughout his life he was known to his friends as Jimmy Crowe. The name signified the man, friendly, unostentatious, hard working. After obtaining his L.D.S. he followed general practice in Dorking, in Cambridge and then in Bedford. He was a careful and competent practitioner, greatly beloved by his patients. Always keenly interested in the wider work of his profession, he was, at the time of his death engaged in organising a Bedford Section of the local Branch of the British Dental Association. The death of Mr. Crowe, at the age of 59, will be mourned by all who knew him; he leaves a widow and two sons.

'The Charge for Announcements of Births, Marriages and Deaths is 2s. 6d. per Line. (Approximately 8 words.) Minimum 7s. 6d.

Births

DUTT.—On September 10, 1950, at Cheriton Nursing Home, Swindon, to Dorothy (*née* Wagstaff), wife of Squadron Leader M. C. Dutt, F.D.S. R.C.S.Eng., a brother for Nigel—Colin Richard.

HEALY.—On September 1, 1950, at The Middlesex Hospital, to Rosalind (*née* Beaumont), wife of James A. Healy, L.D.S., of 27, Weymouth Street, W.1, a son.

Marriages

MACGREGOR—BEAUCHAMP.—On September 9, 1950, at Woodford Parish Church, Harvey Macgregor, L.D.S.Edin., of Haywards Heath, to Jean, only child of W. S. Beauchamp, L.D.S.Eng., of Walthamstow.

SUTTON—EDELSTEN.—On September 2, at Wonston Parish Church, Paul Stanley Sutton, L.D.S. R.C.S.Eng., son of the late Mr. W. S. Sutton and Mrs. Sutton of Horsham, Sussex, to Anne Margaret, daughter of Dr. and Mrs. G. M. M. Edelsten, of Sutton Scotney, near Winchester.

Our Diary

Friday and Saturday, September 22 and 23.

West Lancashire, West Cheshire and North Wales Branch.—Annual Meeting, Prince of Wales Hotel, Southport. Friday: 11 a.m., Annual Golf Competition, West Lancashire Golf Club; 3.30 p.m., Annual Meeting, Prince of Wales Hotel; 7.30 p.m., Annual Dinner and Dance. Saturday: 10.30 a.m., General Meeting (cont.), Inaugural Address; 2.30 p.m., "The Work of the Health Acts Committee," L. E. Balding.

Tuesday, September 26.

Croydon and District Section.—Annual Meeting, The Y.W.C.A., Lansdown Road, Croydon, 8.15 p.m. Film: "Muco Seal Technique."

Preston, Leyland and Chorley Section.—Starkie House, Starkie Street, Preston, 7.30 p.m. "Problems in Root Treatment," J. Kurer.

Wednesday, September 27.

British Dental Association Photographic Society.—13, Hill Street, Berkeley Square, London, W.1, 7 p.m. Discussion by members on a Portfolio of Prints from the Royal Photographic Society.

Society of Dental Anæsthetists.—Bonnington Hotel, Southampton Row, London, W.C.1. 5.30 p.m., Annual General Meeting; 7.30 p.m., "The Anatomy and Physiology of Respiration with special reference to Anæsthesia," James Campbell.

Wessex Branch.—Royal Hotel, Weymouth, 8 p.m., preceded by informal dinner, 7 p.m. "Current Affairs," A. H. Condry.

Thursday, September 28.

Central Counties Branch.—Council Meeting, Birmingham Medical Institute, 7 p.m.

Friday, September 29.

Society of Medical Officers of Health—Dental Officers Sub-Group.—Annual Meeting, Hastings Hall, Tavistock House, London, W.C.1, 7.30 p.m. "Treatment of Injured Teeth in Children," D. C. O'Regan.

West Kent and District Section.—Wrotham Park Club. Informal dinner, 7.30 p.m. "Cases of Interest," Professor M. A. Rushton.

Monday, October 2.

Metropolitan Branch—South Eastern Section.—War Memorial Hospital, Shooters Hill, S.E.18, 8 p.m., preceded by coffee 7.30 p.m. "Origin and Early History of Acrylic Eyes," A. H. Clarkson.

Tuesday, October 3.

East Lancashire and East Cheshire Branch.—Medical School, Manchester 13, 7.30 p.m. Films on "Silicate Cements" and "Dental Amalgam failure due to Moisture Contamination," presented by J. K. Holt.

Friday, October 6.

The Royal Dental Hospital of London, School of Dental Surgery.—Annual Prize Distribution, 8 p.m. Sir Cecil Wakeley, *K.B.E.*, will present the awards.

Surgical Instrument Manufacturers' Association—Croydon Branch.—Norbury Library Hall, 7.30 p.m. Tickets from Hon. Sec., H. J. Nowers, 86, Croydon Road, Croydon.

Friday and Saturday, October 6 and 7.

Southern Counties Branch.—Annual Meeting, Lion Hotel, Guildford. Friday: Council Meeting. Saturday: 10.30 a.m., Business Meeting; 1 p.m., Luncheon; 2.30 p.m., Valedictory Address and Inauguration of President. "Practical Application of Recent Research Work on the Dentine," Professor E. B. Manley. Tea by invitation of the Guildford Section.

Monday, October 9.

The British Society for the Study of Orthodontics.—Manson House, 26, Portland Place, London, W.1, 7.30 p.m. "Studies in the Development of the Mandible," N. B. B. Symons.

The British Society of Periodontology.—Institute of Dental Surgery, Eastman Dental Hospital, Gray's Inn Road, London, W.C.1, 5 p.m. Presidential Address, C. de Vere Green.

BRITISH DENTAL JOURNAL SUPPLEMENT

September 19, 1950

ASSOCIATION NOTICES

BRITISH DENTAL ASSOCIATION

13, Hill Street, Berkeley Square, London, W.1.
Telegrams: "Bridention," Audley, London.
Telephone Nos.: Grosvenor 1592, 1593.
Journal Office: **Grosvenor 2761.**
Dentists' Provident Society and Dentists' Insurance Committee. Telephone No.: Grosvenor 1172.

TIME LIMITS FOR TREATMENT

Position After September 30

MEMBERS are warned that, in accordance with the terms of E.C.N.54, issued to all practitioners through Executive Councils in May last, the time limits laid down in paragraph 7(5) of the Terms of Service will be enforced after September 30, 1950. By that date the treatment for all time-expired E.C.17s should have been completed and the forms returned for authorisation of payment.

In spite of the warning already given it is evident that many members will be left at the end of September with estimate forms which are out of date and which contain treatment so far uncompleted. The Ministry E.C.N. referred to above does not give any clear guidance as to what procedure should then be adopted. Members are, however, recommended to adopt the following procedure :

(1) Complete the E.C.17 by indicating in Column II the work which has actually been completed—with the appropriate fees. (2) In Part 5 state briefly why it has been impossible to complete treatment. (3) Attach a new E.C.17 for the outstanding treatment, estimated at the present scale.

No indication can yet be given as to the probable reaction of the Dental Estimates Board but members must realise that it may well be that, while authorising payment, they may, before giving authority for completion of the outstanding work, refer the case to the Executive Council for investigation by the Dental Services Committee as to whether the dentist is in breach of his terms of service.

Wherever special circumstances (such as the breaking of appointments, the illness of the patient or of the dentist himself) account for the failure to complete treatment this should be explained in an accompanying note.

In the future it is considered that treatment should be completed within the time limits laid down. Where, for any adequate reason, it becomes evident that this will be impossible an extension of time should be requested at least two weeks before the date of normal expiry of the authorisations.

Members encountering further difficulties should write with all necessary details to The Secretary, Health Acts Department, British Dental Association, 13, Hill Street, Berkeley Square, London, W.1.

P.D.O. Group Notes

SEPTEMBER has come and the holidays are nearly over. The unequal struggle of a steadily decreasing staff to cope with ever-increasing demands for treatment will shortly start again. Doubtless advertisements by the local authorities will continue to appear, with the usual results, and everyone will deplore the tragic neglect of the children's teeth and nobody will take any action about it. After the maximum of delay short of indifference, the Whitley Council will meet again, and the endless wrangle will go on. In the meanwhile from all directions one hears of further resignations, as faith and hope sink lower with the passing of time. What comfort can be offered to the surviving P.D.O.s? Merely this—that the "Staff Side" will make every effort possible to induce the local authorities to see this problem in a realistic light and to obtain a fair and just settlement. How far they will succeed will depend on whether the "Employers Side" will abandon the old erroneous conceptions of the status and importance of school dentistry. If they cannot see the light then the only alternatives would seem to be the virtual extinction of the service or the handing over of control to another body. In the meanwhile no better advice can be given to the remaining staff than to keep their line of retreat well organised—just in case. Everyone wishes that the negotiations in the Whitley Council should proceed without prejudice, nevertheless, in the light of all that has passed in the chequered history of school dentistry, only the less wise of us will be so full of confidence as to have no other plans for the future.

The next function of the Group will be its Annual General Meeting at Cambridge on November 18. This is the meeting at which there is most plain speaking by the rank and file, and it will come at a time when the whole future of our services will be in the melting pot. All members should make a special effort to be present, not only to contribute their views, but to support the new President, Mr. J. D. Sykes, on his entering a momentous year of office. Would members please book the date, November 18. H. D. H.

Correspondence

Health Service Extravagance.—A reduction of 85 per cent in the size of the Dental Estimate Form could easily be made, some 270 square inches (nearly two square feet) being eliminated from each form. As some ten to twenty million of these forms are being used each year, many tons of newsprint could readily be made available for other purposes.

Perhaps the Government could be persuaded to look into this example of gross extravagance and waste.—C. N. JEFFRIES, 704, *Kingstanding Road, Birmingham, 22C.*

NEW MEMBERS

(N.I.) AUSTIN, Cecil William Stead, L.D.S.Belf., 44, University Road, Belfast.

(W.S.) BAXTER, David, L.D.S.Glasg., 44, Scott Street, Hamilton, Lanarkshire.

(W.S.) CALDWELL, Robert Craig, L.D.S.Glasg., Kames House, Millport, Isle of Cumbrae.

(E.C.) ILIFFE, Roy George, L.D.S.Eng., 85, High Street, Chelmsford, Essex.

(W.) KERR, William Milloy (Lieutenant, Royal Army Dental Corps), L.D.S.Glasg., 69, Army Dental Centre, Bulford, Wilts.

(W.S.) SCOTT, James Angus, L.D.S.Glasg., 16, Lawrence Street, Glasgow, W.1.

FORTHCOMING MEETINGS AT HEADQUARTERS

September	23	Remuneration Committee	10.30 a.m.
,,	25	Executive Committee	7.00 p.m.
,,	27	House Committee	5.00 p.m.
October	2	Health Acts Committee	9.30 a.m.
,,	2	Priority Classes Committee	10.30 a.m.
,,	19	Council	10.00 a.m.
,,	20	Law & Ethics Committee	9.30 a.m.
,,	20	Representative Board	2.00 p.m.
,,	20	Ben. Fund Adjourned A.G.M. ...	2.00 p.m.
,,	21	Representative Board	10.00 a.m.

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